

LISTING OF CLAIMS:

1. (Previously presented) A pattern forming method characterized by forming a mask having pattern-forming openings on a workpiece surface, and then supplying and solidifying a liquid pattern material in the pattern-forming openings of the mask.

2. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings while also drying the liquid-pattern material;

- a process for removing the mask from the workpiece; and

- an annealing process for annealing dried solute of the liquid-pattern material.

3. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

- a drying process for evaporating solvent in the liquid-pattern material;

- a mask removal process for removing the mask from the workpiece; and

- an annealing process for annealing dried solute in the liquid-pattern material.

4. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

- a solidifying process for solidifying the liquid-pattern material supplied into the pattern-forming openings; and

a mask removal process for removing the mask from the workpiece after sequentially performing plural times the pattern material supply process and solidifying process.

5. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

an adherent-liquid removal process for removing liquid pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the openings;

a drying process for drying by evaporating solvent from the liquid-pattern material in the pattern-forming openings;

an annealing process for annealing the dried solute after sequentially performing plural times the pattern material supply process, adherent-liquid removal process, and drying process; and

a mask removal process for removing the mask from the workpiece.

6. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

a drying process for drying by evaporating solvents from the liquid-pattern material in the pattern-forming openings; and

an annealing process for annealing the dried solute after sequentially performing plural times the pattern material supply process and drying process.

7. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

a solidifying process for solidifying the liquid-pattern material supplied into the pattern-forming openings;

a solid-material removal process for removing solidified elements of the liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings; and

a mask removal process for removing the mask from the workpiece after sequentially performing plural times the pattern material supply process, solidifying process, and solid-material removal process.

8. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the mask openings;

a drying process for drying by evaporating solvent from the liquid-pattern material in the pattern-forming openings;

a solid-material removal process for removing dried solids of the liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings;

an annealing process for annealing the dried solute after sequentially performing plural times the pattern material supply process, drying process, solid-material removal process; and

a mask removal process for removing the mask from the workpiece.

9. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the mask openings;

a drying process for drying by evaporating solvent from the liquid-pattern material in the pattern-forming openings;

a solid-material removal process for removing dried solids of the liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings;

an annealing process for annealing the dried solute; and

a mask removal process for removing the mask from the workpiece after sequentially performing plural times the pattern material supply process, drying process, solid-material removal process, and annealing process.

10. (Previously presented) A pattern forming method as described in claim 1, wherein the mask has hydrophobic properties on at least the surface thereof.

11. (Previously presented) A pattern forming method as described in claim 1, wherein the mask is hydrophobic.

12. (Previously presented) A pattern forming method as described in claim 1, wherein the liquid-pattern material is solidified by applying heat.

13. (Previously presented) A pattern forming method as described in claim 12, wherein heating and solidifying the liquid-pattern material comprises a drying process for evaporating solvent in the liquid pattern material, and an annealing process for annealing the dried solute.

14. (Previously presented) A pattern forming method as described in claim 1, wherein the mask is removed from the workpiece after solidifying the liquid pattern material.

15. (Previously presented) A pattern forming method as described in claim 1, wherein:

the liquid-pattern material is solidified after removing liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings.

16. (Original) A pattern forming method as described in claim 6, wherein the annealing process is performed after removing the mask from the workpiece.

17. (Original) A pattern forming method as described in claim 6, wherein the mask is removed from the workpiece after the annealing process.

18. (Previously presented) A pattern forming method as described in claim 2, wherein the process for removing the mask and the annealing process are performed simultaneously.

19. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings while also drying the liquid-pattern material;

- an annealing process for annealing dried solute of the liquid-pattern material; and

- a process for removing the mask from the workpiece.

20. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

- a drying process for evaporating solvent in the liquid-pattern material;

- an annealing process for annealing dried solute in the liquid-pattern material; and

- a mask removal process for removing the mask from the workpiece.

21. (Previously presented) A pattern forming method comprising:

- a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

- a pattern material supplying process for supplying a liquid-pattern material to the pattern-forming openings;

an adherent-liquid removal process for removing liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings;

a drying process for drying by evaporating solvent in from liquid-pattern material in the pattern-forming openings;

a mask removal process for removing the mask from the workpiece after sequentially performing plural times the pattern material supply process, adherent-liquid removal process, and drying process; and

an annealing process for annealing the dried solute.

22. (Previously presented) A pattern forming method comprising:

a mask forming process for forming a mask having pattern-forming openings on a workpiece surface;

a pattern material supplying process for supplying a liquid-pattern material to the mask openings;

a drying process for drying by evaporating solvent from the liquid-pattern material in the pattern-forming openings;

a solid-material removal process for removing dried solids of the liquid-pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming openings;

a mask removal process for removing the mask from the workpiece after sequentially performing plural times the pattern material supply process, drying process, and solid-material removal process; and

an annealing process for annealing the dried solute.

23. (Withdrawn) A pattern forming method characterized by supplying and solidifying a liquid-pattern material in a specific pattern-forming trench disposed in a workpiece.

24. (Withdrawn) A pattern forming method characterized by performing plural times a process for supplying and solidifying a liquid-pattern material in a specific pattern-forming trench disposed in a workpiece.

25. (Withdrawn) A pattern forming method comprising:

a pattern material supply process for supplying a liquid-pattern material to a specific pattern-forming trench disposed in a workpiece;

an adherent-liquid removal process for removing liquid pattern material that adhered to the mask surface when the liquid-pattern material was supplied to the pattern-forming trench;

a drying process for drying by evaporating solvent from the liquid-pattern material in the pattern-forming trench; and

an annealing process for annealing solute contained in the dried liquid-pattern material after sequentially performing plural times the pattern material supply process, adherent-liquid removal process, and drying process.

26. (Withdrawn) A pattern forming method characterized by sequentially performing plural times:

a pattern material supply process for supplying a liquid-pattern material to a specific pattern-forming trench disposed in a workpiece;

a solidifying process for heating and solidifying the liquid-pattern material supplied to the pattern-forming trench; and

an adherent-solid removal process for removing solids of the liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the trench.

27. (Withdrawn) A pattern forming method comprising:

a pattern material supply process for supplying a liquid-pattern material to a specific pattern-forming trench disposed in a workpiece;

a drying process for evaporating solvent from the liquid-pattern material supplied to the pattern-forming trench; and

an annealing process for annealing solute contained in the dried liquid-pattern material after sequentially performing plural times the pattern material supply process and drying process.

28. (Withdrawn) A pattern forming method comprising:

a pattern material supply process for supplying a liquid-pattern material to a specific pattern-forming trench disposed in a workpiece;

a drying process for evaporating solvent from the liquid-pattern material supplied to the pattern-forming trench;

an adherent-solid removal process for removing dried solids of the liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the pattern-forming trench; and

an annealing process for annealing solute contained in the dried liquid-pattern material after sequentially performing plural times the pattern material supply process, drying process, and adherent-solid removal process.

29. (Withdrawn) A pattern forming method characterized by performing once or plural times:

a pattern material supply process for supplying a liquid-pattern material to a specific pattern-forming trench disposed in a workpiece;

a drying process for evaporating solvent from the liquid-pattern material supplied to the pattern-forming trench;

an adherent-solid removal process for removing dried solids of the liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the pattern-forming trench; and

an annealing process for annealing solute contained in the dried liquid-pattern material.

30. (Withdrawn) A pattern forming method as described in claim 23, wherein:

the liquid-pattern material is supplied to the pattern-forming trench after applying hydrophobic processing to the workpiece surface.

31. (Withdrawn) A pattern forming method as described in claim 23, wherein:

the liquid-pattern material is supplied to the pattern-forming trench after applying hydrophobic processing to the workpiece surface, and applying hydrophilic processing to the bottom of the pattern-forming trench.

32. (Withdrawn) A pattern forming method as described in claim 23, wherein:

the liquid-pattern material is solidified by heating the liquid-pattern material.

33. (Withdrawn) A pattern forming method as described in claim 32, wherein:

heating and solidifying the liquid-pattern material comprises a drying process for evaporating solvent in the liquid pattern material, and an annealing process for annealing the dried solute.

34. (Withdrawn) A pattern forming method as described in claim 23, characterized by solidifying the liquid-pattern material and then removing solidified elements of the liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the pattern-forming trench.

35. (Withdrawn) A pattern forming method as described in claim 23, wherein solidifying the liquid-pattern material is performed after removing liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the pattern-forming trench.

36. (Withdrawn) A pattern forming method as described in claim 27, wherein the annealing process is performed after removing dried solids of liquid-pattern material that adhered to the workpiece surface when the liquid-pattern material was supplied to the pattern-forming trench.

37. (Withdrawn) A pattern forming method comprising:

- a process for disposing an organic film on a workpiece surface;
- a process for forming a trench of a specific pattern in the organic film;
- a process for filling the trench with an inorganic material;
- a process for removing the inorganic material except from inside the trench; and
- a process for removing the organic film and leaving a pattern of the inorganic material.

38. (Withdrawn) A pattern forming method as described in claim 37, wherein the process for filling the trench with the inorganic material is accomplished by applying a solution containing the inorganic material.

39. (Withdrawn) A pattern forming method as described in claim 38, wherein the inorganic material is a liquid or a liquid-gas mixture.

40. (Withdrawn) A pattern forming method as described in claim 38 , wherein:
the inorganic material is applied by spin coating.
41. (Withdrawn) A pattern forming method as described in claim 38 , wherein:
the inorganic material is applied by spraying.
42. (Withdrawn) A pattern forming method as described in claim 37, wherein:
the process for removing the inorganic material except inside the trench
is accomplished by applying an etching solution.
43. (Withdrawn) A pattern forming method as described in claim 42, wherein:
the etching solution is a liquid or a liquid-gas mixture.
44. (Withdrawn) A pattern forming method as described in claim 42 , wherein:
the etching solution is applied by spin etching.
45. (Withdrawn) A pattern forming method as described in claim 42 , wherein:
the etching solution is applied by spraying.
46. (Withdrawn) A pattern forming method as described in claim 37, wherein:
the process for removing the inorganic material except inside the trench
is accomplished by CMP.
47. (Withdrawn) A pattern forming method as described in claim 37, wherein:
the organic film is removed with atmospheric pressure plasma.
48. (Withdrawn) A pattern forming apparatus comprising:
a mask forming unit for forming a mask by disposing pattern-forming
openings in a mask material coated to and solidified on a workpiece surface;
a hydrophobic processing unit for applying hydrophobic processing to the
solidified mask material or mask;
a pattern material supply unit for supplying a liquid-pattern material to
the pattern-forming openings of the mask; and
a solidification unit for solidifying the liquid-pattern material in the
pattern-forming openings.

49. (Withdrawn) A pattern forming apparatus comprising:

a mask forming unit for forming a mask by disposing pattern-forming openings in a mask material coated to and solidified on a workpiece surface;

a hydrophobic processing unit for applying hydrophobic processing to the solidified mask material or mask;

a pattern material supply unit for supplying a liquid-pattern material to the pattern-forming openings of the mask;

a solidification unit for solidifying the liquid-pattern material in the pattern-forming openings; and

a mask removal unit for removing the mask after solidifying the liquid-pattern material.

50. (Withdrawn) A pattern forming apparatus as described in claim 48, wherein:

the hydrophobic processing unit comprises a plasma generating means for producing a fluoride gas plasma at atmospheric pressure or near atmospheric pressure, and supplying the plasma to the solidified mask material or mask.

51. (Withdrawn) A pattern forming apparatus as described in claim 48, wherein:

the hydrophobic processing unit comprises a polymerization means for producing a fluorocompound plasma, and polymerizing a fluororesin film on the surface of the solidified mask material or mask.

52. (Withdrawn) A pattern forming apparatus as described in claim 50, wherein:

the hydrophobic processing unit comprises a hydrophilic processing means for making hydrophilic the inside of the pattern-forming openings of the hydrophobic processed mask.

53. (Withdrawn) A pattern forming apparatus comprising:

a mask forming unit for forming a mask comprising a hydrophobic film having pattern-forming openings on the surface of a workpiece;

a pattern material supply unit for supplying a liquid-pattern material to the pattern-forming openings of the mask;

a solidification unit for solidifying the liquid-pattern material in the pattern-forming openings; and

a mask removal unit for removing the mask after solidifying the liquid-pattern material.

54. (Withdrawn) A pattern forming apparatus as described in claim 50, wherein:

the mask forming unit includes a polymerization means for producing a fluorocompound plasma, and polymerizing a fluororesin film on the surface of the workpiece through a transfer mask.

55. (Withdrawn) A pattern forming apparatus as described in claim 48, wherein:

the pattern material supply unit includes an adherent-liquid removal means for removing liquid-pattern material that adhered to the mask surface.

56. (Withdrawn) A pattern forming apparatus as described in claim 48, wherein:

the pattern material supply unit comprises an atomization means for atomizing and misting the liquid-pattern material on the mask.

57. (Withdrawn) A pattern forming apparatus as described in claim 56, wherein:

the pattern material supply unit comprises a rotating means for rotating the workpiece.

58. (Withdrawn) A pattern forming apparatus as described in claim 56 , wherein:

the pattern material supply unit comprises a voltage applying means for applying a voltage to the workpiece so that static attraction works to attract the atomized liquid-pattern material to the workpiece.

59. (Withdrawn) A pattern forming apparatus as described in claim 48, wherein:

the solidification unit comprises a heating means disposed in the pattern material supply unit for heating and solidifying the liquid-pattern material.

60. (Withdrawn) A semiconductor device characterized by being manufactured using a pattern forming method as described in claim 1.

61. (Withdrawn) An electrical circuit characterized by being manufactured using a pattern forming method as described in claim 1.

62. (Withdrawn) A display module characterized by being manufactured using a pattern forming method as described in claim 1.

63. (Withdrawn) A color filter characterized by being manufactured using a pattern forming method as described in claim 1.

64. (Withdrawn) A light-emitting element characterized by being manufactured using a pattern forming method as described in claim 1.